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A REDESCRIPTION OF THE TROGLOBITIC ISOPOD, *CAECIDOTEA STYGIA*, FROM THE ENVIRONS OF CINCINNATI, OHIO (CRUSTACEA: ISOPODA: ASELLIDAE)

Thomas E. Bowman and David C. Beckett

Abstract.—In the second record from Ohio, *Caecidotea stygia* is reported from 3 intermittent streams near Cincinnati. The specimens collected were apparently flushed from groundwater following heavy rains. The Ohio specimens are described and illustrated in detail.

Caecidotea stygia was originally described from Mammoth Cave, Edmonson County, Kentucky (Packard, 1871). Despite numerous subsequent records, many of them summarized by Steeves (1963), this species remained inadequately characterized until a full description with a few figures of a topotypic ♂ and ♀ was given by Racovitza (1950). No mention of Racovitza's account was given by Steeves, who provided a diagnosis and illustrations of diagnostic features.

Many additional distributional records of *C. stygia* were given by Fleming (1972). Figure 1 shows the occurrences, by county, reported by Steeves (1963) and Fleming (1972). It is widely distributed in Kentucky and extends into southern Indiana and Illinois. Apparently disjunct populations have been identified by Fleming at the Kentucky–Illinois border and in the vicinity of St. Louis, Missouri. It would be of interest to reexamine these populations.

Until now, the only Ohio record for *C. stygia* has been Cedar Fork Cave, Adams Co. (Fleming, 1972). We have collected it from 3 sites near Cincinnati, Hamilton Co. (Fig. 2): (1) Mt. Airy Forest, Cincinnati, intermittent stream along west edge of White Pine picnic area near West Fork Road, leg. D. C. Beckett, 29 March 1973, 1♀. (2) Winton Woods, Hamilton Co. Park, just E of Stoney Brook Hollow picnic area, intermittent stream draining part of nearby golf course, about 12 km from Mt. Airy site, leg. D. C. Beckett, 25 Oct. 1975, 1♀, 1♂. (3) Intermittent stream near New Richmond, on property of Ralph M. Sinclair, near Laurel-Lindale Rd.; the stream flows into Hog Hollow Creek, a tributary of Twelve Mile Creek, which flows into Ohio River; site is ca. 39 km from Mt. Airy site and 45 km from Winton Woods; leg. D. C. Beckett and R. M. Sinclair, 19 March 1977, 11♀♀, 8♂♂.

All 3 collections were made from intermittent streams in hillside woodland situations. All 3 streams are dry most of the year, continual flow occurring only in the winter or early spring. Each of these collections of subterranean asellids from surface waters was made following a period of heavy rains which elevated the groundwater table, flushing out the subterranean isopods.

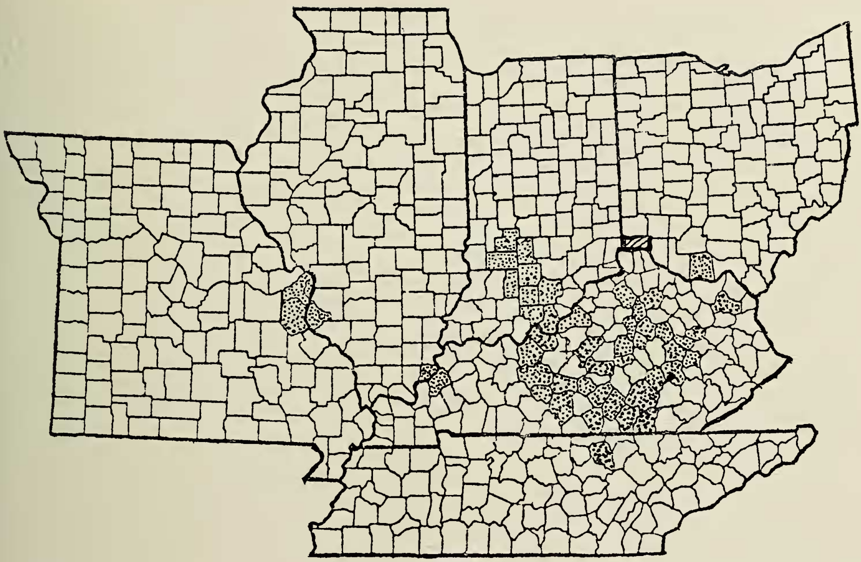

Fig. 1. Reported occurrences, by county, of *Caecidotea stygia*. Stippling = published records; hachure = new records reported herein, Hamilton Co., Ohio.

The bedrock in the area of the collection sites is a mixture of shale and limestone of Ordovician age, covered with deposits of glacial origin. This part of Ohio lacks the massive limestone development found to the south in Kentucky, and we presume that *C. stygia* lives as a phreatobite in southwestern Ohio.

We give below a description of the Hamilton Co. material, illustrating some features of *C. stygia* for the first time. The specimens are deposited in the Division of Crustacea, Smithsonian Institution.

Caecidotea stygia Packard
Figs. 3–6

Caecidotea stygia Packard, 1871:752, figs. 132–133. Type-locality, Mammoth Cave, Edmonson Co., Kentucky ["It was found creeping over the fine sandy bottom, in company with the Campodea [Thysanura], in a shallow pool of water four or five miles from the mouth of the cave"].

Asellus stygius (Packard).—Racovitza, 1950:164–176, figs. 1–13.—Steeves, 1963:472–474, figs. 2–6 [synonymy, distribution].—Fleming, 1972:249–252 [new distribution records].

For an explanation of the use of *Caecidotea* rather than *Asellus*, see Bowman (1975).

Description.—Small, eyeless, unpigmented. Length of largest specimen 6.5 mm (maximum given by Steeves, 16 mm). Body slender, linear,

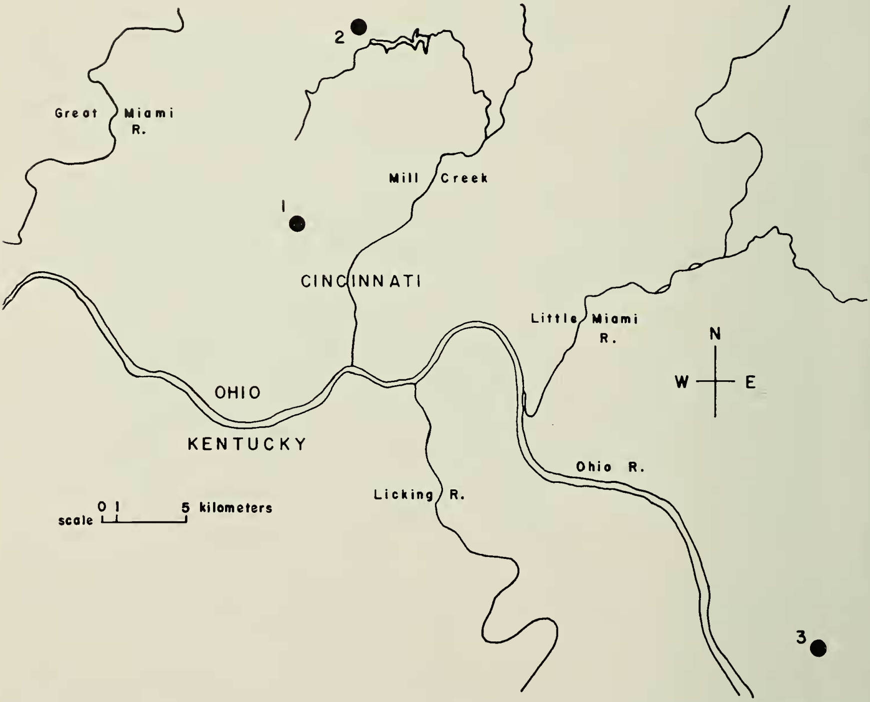

Fig. 2. Localities where *Caecidotea stygia* was collected in Cincinnati, Ohio, and vicinity. 1. Mt. Airy Forest; 2. Winton Woods; 3. New Richmond.

about 4.8× as long as wide; coxae all visible in dorsal view. Margins of head, pereon and telson setose; dorsal surface also with scattered setae (most obscured by adherent debris). Head about 1.8× as wide as long; anterior margin slightly concave, without rostrum; postmandibular lobes weakly developed. Telson about ⅓ longer than wide in 6.5 mm ♂ from New Richmond, ⅕ longer than wide in 3.2 mm ♂ from Winton Woods; sides slightly convex, caudomedial lobe poorly defined.

Antenna 1 nearly reaching distal margin of 5th peduncle segment of antenna 2; flagellum with up to 10 segments, last 6 (♂) or 3 (♀) segments each bearing esthete. Antenna 2 about as long as head + pereonites 1–6; last peduncle segment ⅓ longer than penultimate; flagellum with up to 60 segments.

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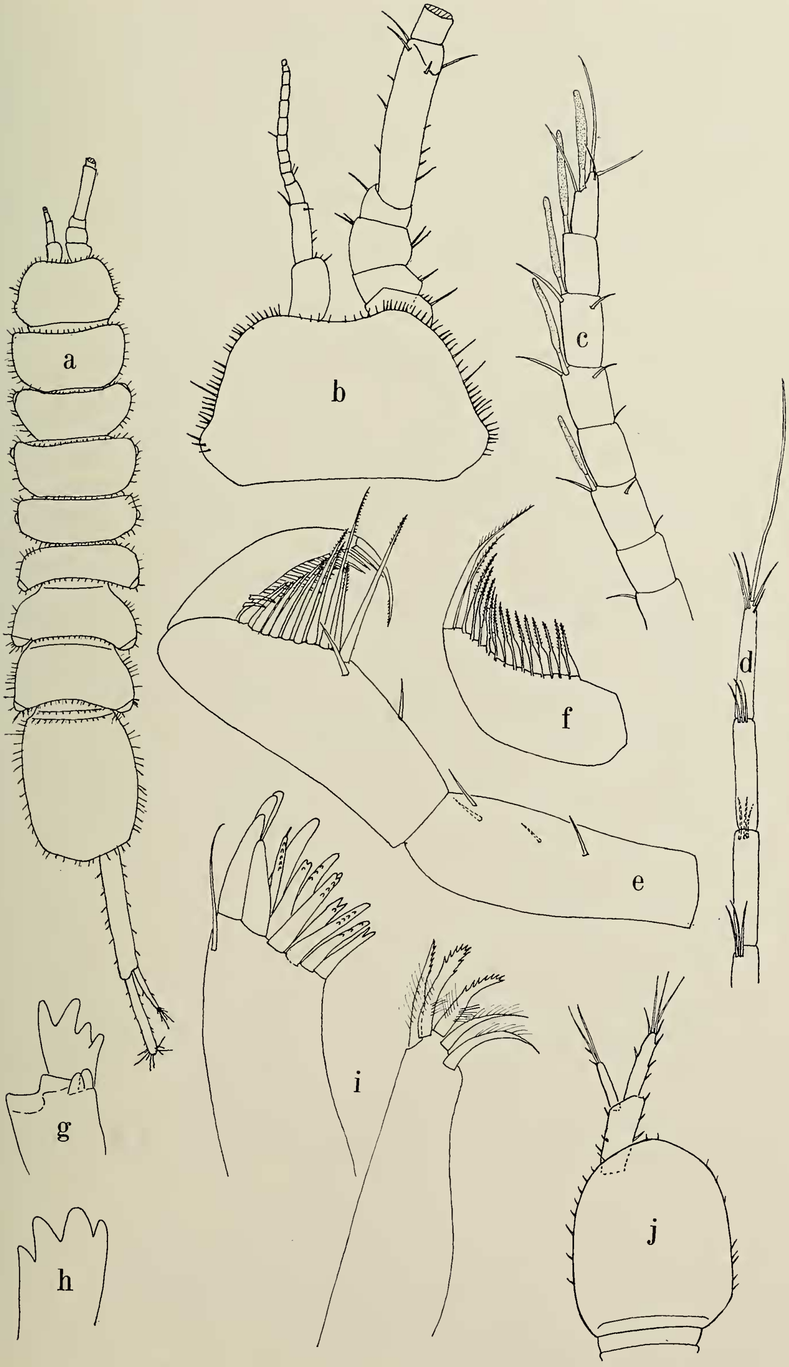
Fig. 3. *Caecidotea stygia*. a–i, 6.5 mm ♂: a, Habitus, dorsal; b, Head dorsal; c, Antenna 1, distal segments; d, Antenna 2, distal segments; e, Mandibular palp; f, Mandibular palp, apical segment; g, Left mandible, incisor and lacinia; h, Right mandible, lacinia; i, Maxilla 1; j, Telson and uropod, 3.2 mm ♂.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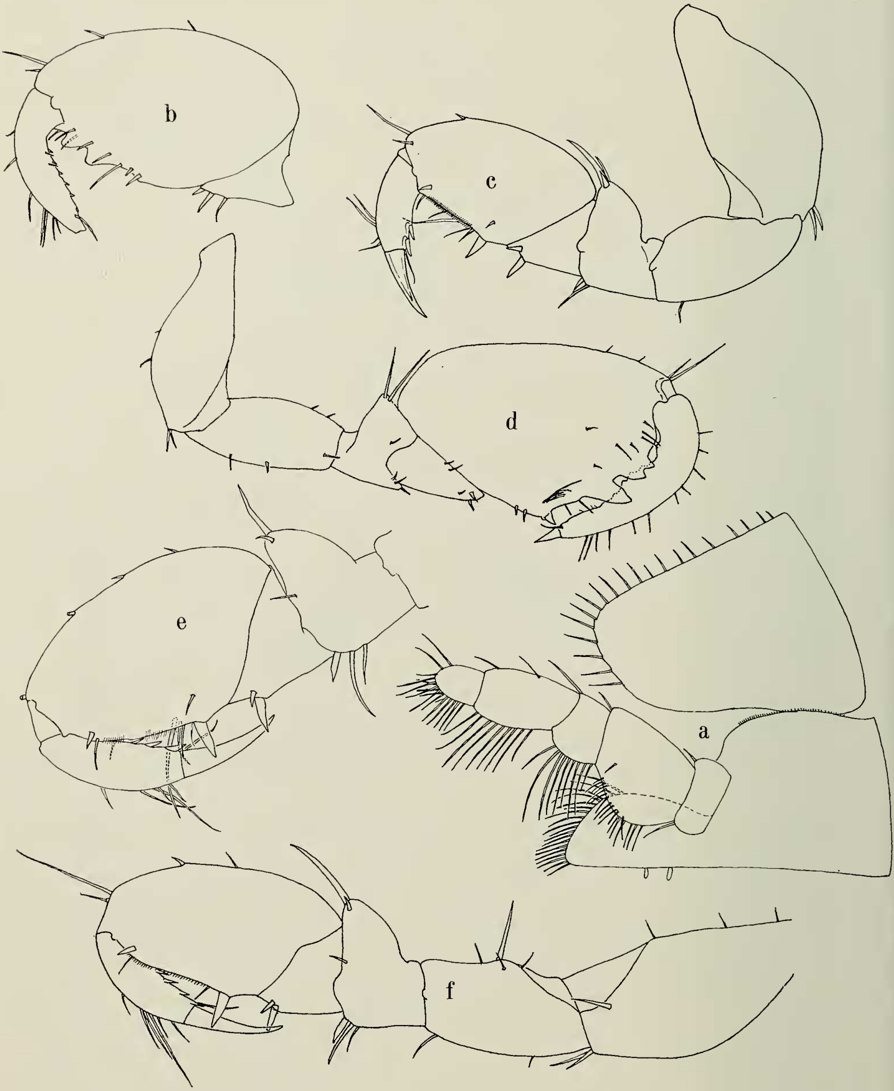


Fig. 4. *Caecidotea stygia.* a, ♀ maxilliped; b–f, Pereopod 1; b, 4.4 mm ♂, Shafer's Cave, Crawford Co., Indiana; c–f, New Richmond, Ohio: c, 3.2 mm ♂; d, 6.5 mm ♂; e, 4.4 mm ♂; f, ♀.

Mandibles with 4-cuspate incisors; lacinia of left mandible 4-cuspate; spine-row with 10 spines in right, 11 spines in left mandible; palp as in figure 3e, f. Maxilla 1, apex of outer lobe with 13 robust spines and subterminal seta; inner lobe with 5 apical plumose setae, 3 of them distally serrate. Maxilliped with 2 retinaculae; distal segment of palp rather short.

Propus of ♀ pereopod 1 with straight palm armed with close-set setules but without palmar processes, palm defined by strong proximal spine; dactyl with about 4 spines on flexor margin. Pereopod 1 of all ♂♂ except largest (6.5 mm) similar to that of ♀. Pereopod 1 of 6.5 mm ♂ with palm of propus more nearly vertical, with smaller defining spine and 2 processes separated by narrow U-shaped gap, higher proximal conical process and lower distal bicuspid process; dactyl with short claw, flexor margin with irregular teeth but without articulating spines.

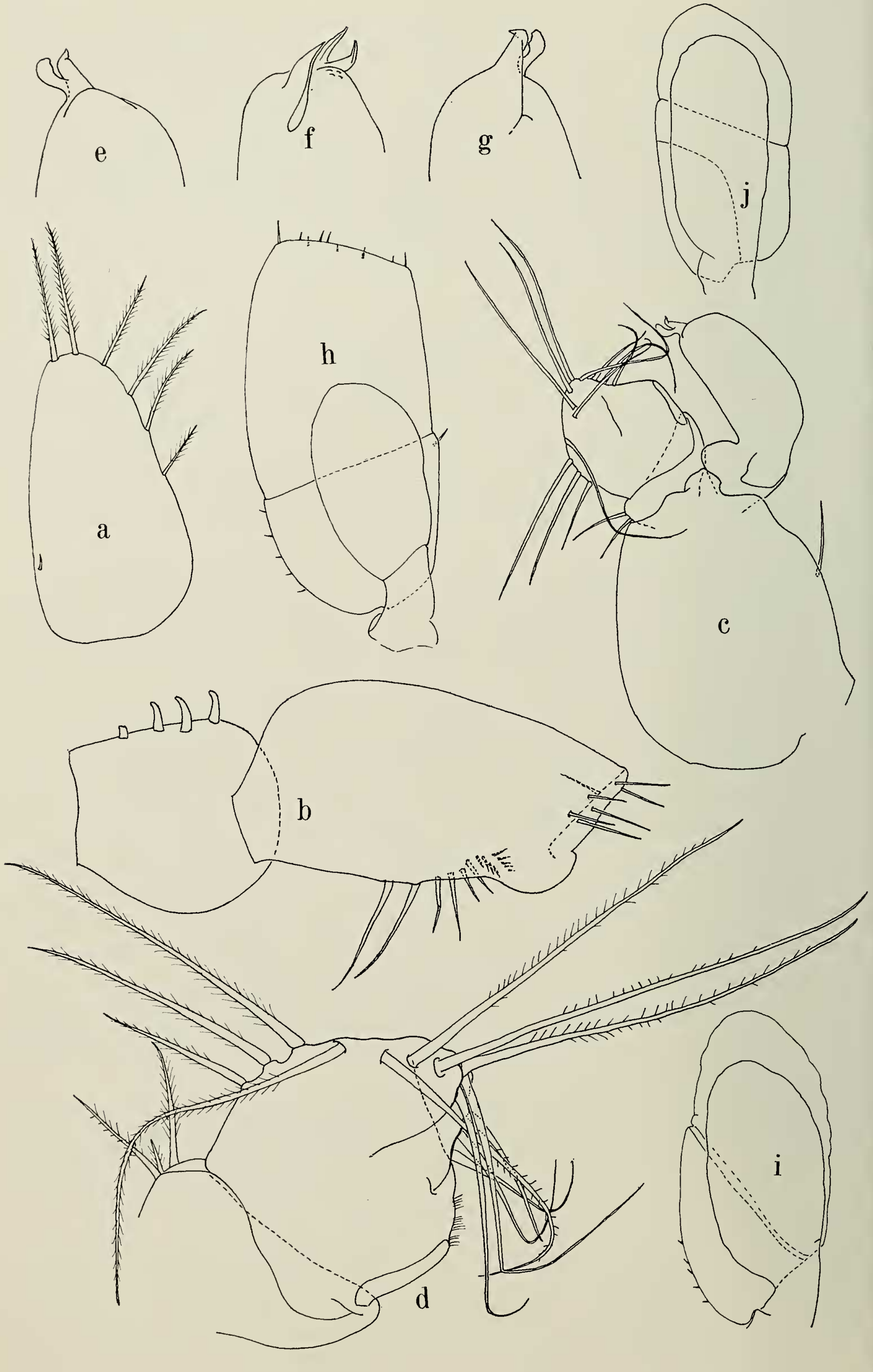
Pereopods 2–7, dactyls without accessory claws; pereopod 4 identical in ♂ and ♀.

Male pleopod 1 larger than pleopod 2; protopod about half as long as exopod, with 3–4 retinaculae. Exopod about twice as long as wide, of somewhat different form in 6.5 mm ♂ than in smaller ♂♂. In latter, lateral margin concave in middle third, armed with setae decreasing in length distally, then increasing in length near rounded distal margin. In 6.5 mm ♂ lateral margin nearly straight; distolateral corner protuberant; distal margin oblique; terminal part of exopod folded back onto posterior surface.

Male pleopod 2 protopod about ⅓ longer than wide, medial margin with single seta. Exopod slightly shorter than endopod; proximal segment with 2–4 setae on lateral margin; distal segment oval in smaller ♂♂, constricted at apex in 6.5 mm ♂, with 8–14 marginal setae (8 in 3.2 mm ♂ from Winton Woods, 10 in 3.8 mm ♂ from New Richmond, 14 in 6.5 mm ♂), those on medial margin (3–4) more sparsely plumose and bent slightly distal to midlength. Endopod tip with slender, nearly straight cannula, directed laterally at angle of about 30° to axis of endopod, tip bent, acute or truncate; lateral process slightly shorter than cannula, sinuate, tip broadened (not apparent at most angles of view) and bent toward cannula; caudal process low, broadly rounded. Female pleopod 2 pyriform, with 2 setae at apex and 4 on lateral margin. Pleopod 3 exopod about twice as long as wide; distal segment about 1.6× length of proximal segment, with a few short setae on truncate distal margin. Pleopod 4 exopod with a few short setae on proximolateral margin and obliquely transverse "line." Pleopod 5 exopod divided into 2 segments by obliquely transverse suture; proximal segment with curved "line."

Uropod longer than telson. Female protopod subequal in length to endopod; ♂ protopod distinctly longer; margins armed with spines, those on medial margin more conspicuous. Endopod more than twice as long as exopod in ♂, about 1.3× as long in ♀; ♂ endopod broader than ♀ endopod.

Remarks.—Our interpretation of the endopod tip of the ♂ pleopod 2 differs from that of Steeves (1963), who did not include the low rounded lobe on the posterior surface that we identify as a caudal process. He interpreted our lateral process as a caudal process and named as lateral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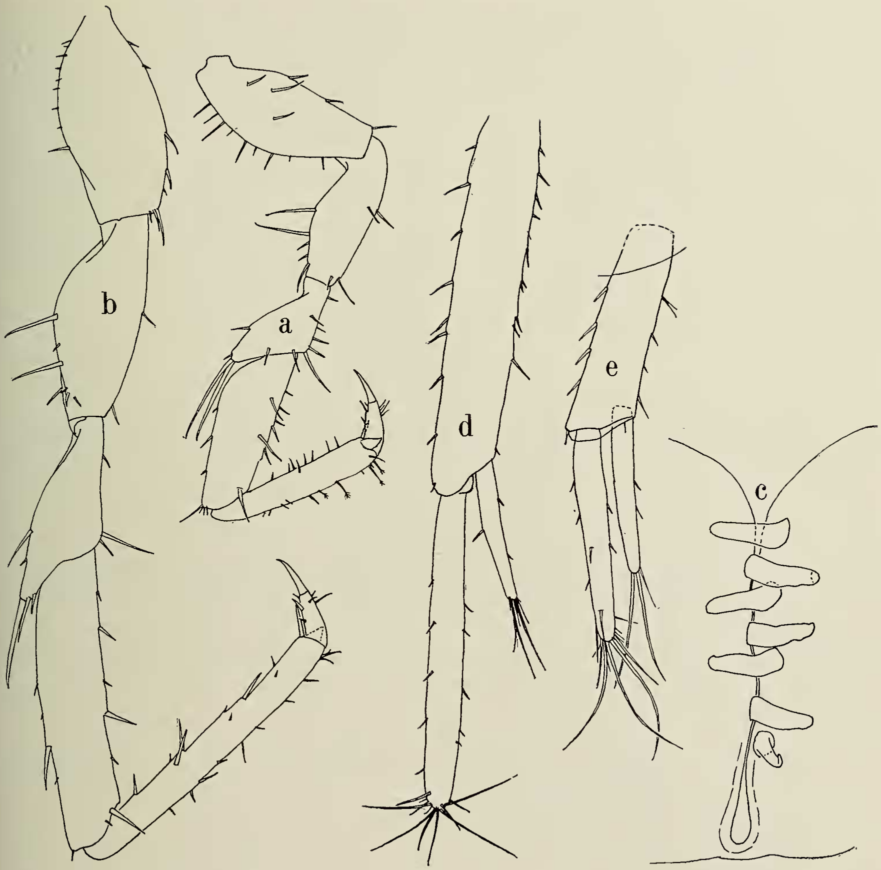

Fig. 6. *Caecidotea stygia.* a, ♂ pereopod 4; b, ♂ pereopod 7; c, Medial margins of protopods of pleopod 1, anterior, showing retinaculae; d, Right ♂ uropod, dorsal; e, Same, ♀.

process an inconspicuous structure on the lateral margin of the fissure, not easily visible in most aspects. We wish to emphasize the importance of examining the endopod tip in several different positions, and the uncertainty of assumed homologies of tip elements among species of *Caecidotea.*

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Fig. 5. *Caecidotea stygia.* a, ♀ pleopod 1; b, ♂ pleopod 1; c, ♂ pleopod 2, posterior; d, Exopod of ♂ pleopod 2; e–g, Endopod tip of ♂ pleopod 2: e, Posterior; f, Anterior; g, Anterolateral; h, Pleopod 3; i, Pleopod 4; j, Pleopod 5.

The delay in differentiation of the ♂ pereopod 1 is of interest, in view of the taxonomic importance commonly assigned to this pereopod. For comparison, pereopod 1 of a 4.4 mm ♂ *C. stygia* from Shafer's Cave, Crawford Co., Indiana, is shown in Fig. 4b. Here the palmar processes are partly developed, in contrast to their absence in a 4.4 mm ♂ from Hamilton Co., Ohio (Fig. 4e). In the Ohio ♂♂ without palmar processes pleopods 1 and 2 are fully differentiated, however. Thus it should not be assumed that a ♂ asellid that appears to be mature on the basis of its pleopods has a fully differentiated pereopod 1. The development of the ♂ pereopod 1 in asellids merits further attention.

Acknowledgments

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